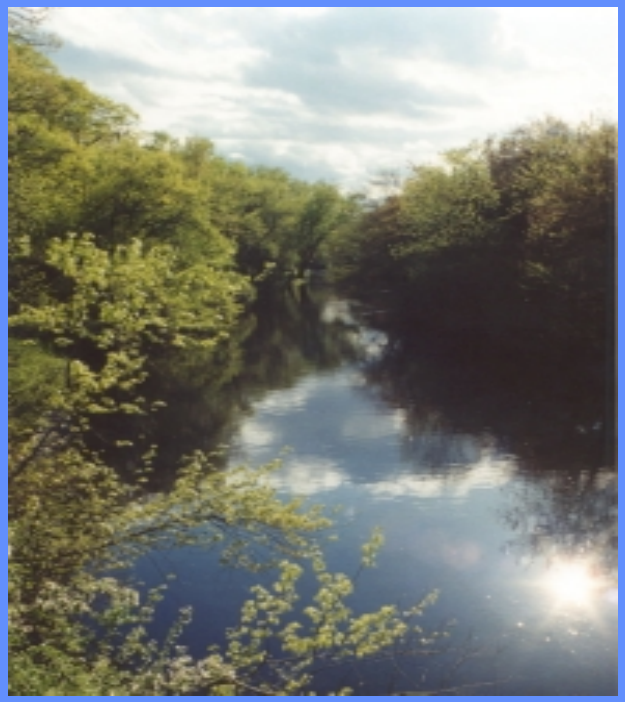
Restoring the Ipswich River



How to go from this……to this

By 2012

Process:
A's and P's,
The long haul

Assessment: Science

- **Awareness**
- **Advocacy**
- **Action**
- **Allies**
- **Angels (help when you really need it…)**
- **Patience and Perseverance**

The Problem: Water Deficit

- Need to Balance the Water Budget
- Water withdrawals
- Lawn Watering
- Imperviousness prevents recharge of aquifers
- Sewers dewater aquifers
- Dams

The Problem

- Flow alteration -- Occurs year-round, worst in summer
- Pump more water than river and aquifers can sustain
- Imperviousness prevents recharge of aquifers
- Sewers dewater aquifers
- Dams are also a factor
- Water supplies not sustainable and cause damage
- Loss of fisheries and critical habitats
- Impact on sport and marine fisheries
- Loss of recreational and aesthetic values important to region’s quality of life and eco-tourism

Current Status

Ipswich River 3rd most endangered in U.S.*

"Impaired" under Federal Clean Water Act

"Highly stressed" by all criteria:

- **Mass Water Resources Commission**

Contamination problems & threats

Small rivers very vulnerable; growing problem especially in eastern MA

Sprawl exacerbates problem

*** American Rivers, 2003**

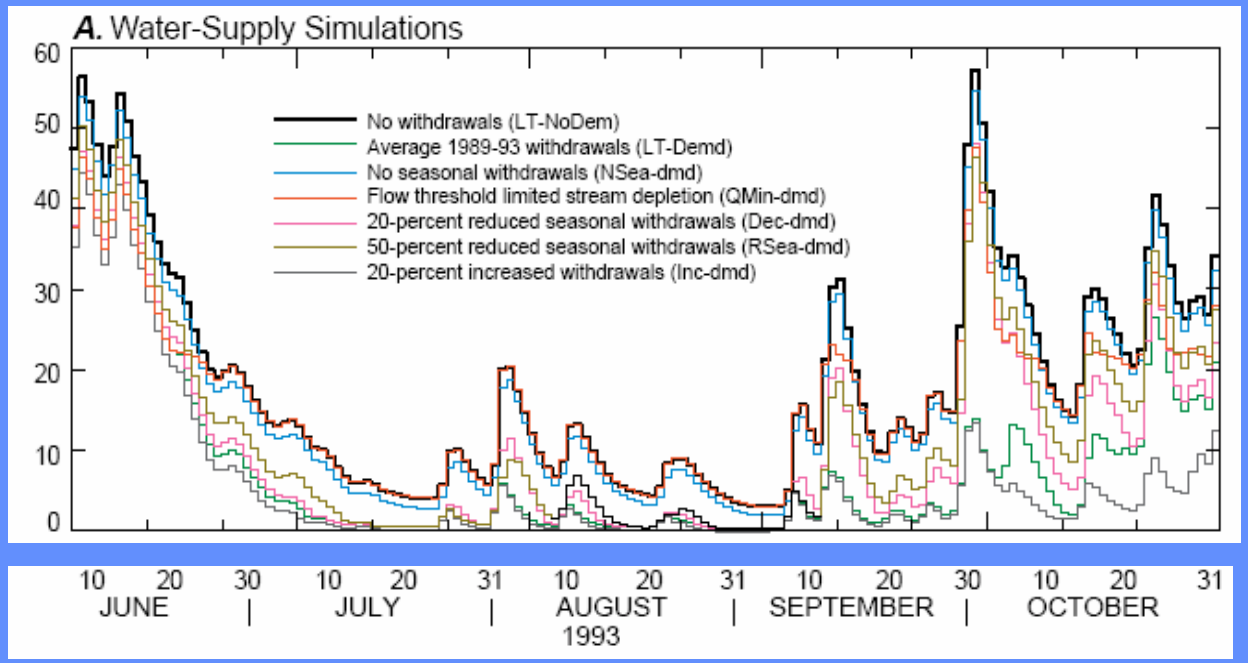
Restoration Goals

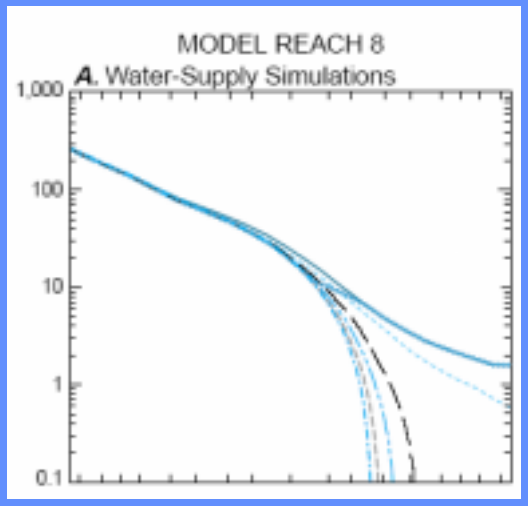
- **Quality: Clean, safe water**
- **Quantity:Balance the Water Budget**
  - **Enough water for human uses and the environment**
- **Healthy habitats for fish and other wildlife**
- **Recreational and scenic values and uses**
- **Sustain “smart growth,” livable communities**
- **Build Partnerships to solve problems**

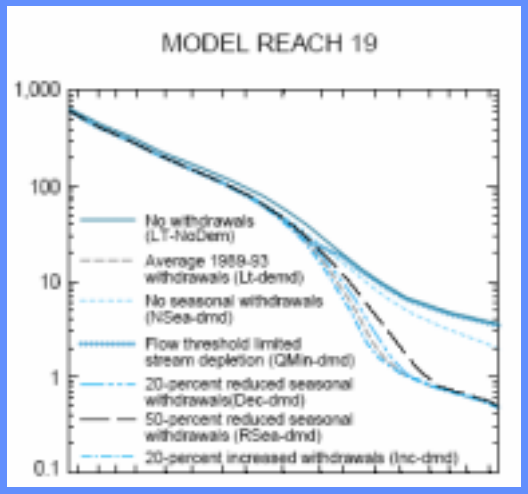
Outstanding Scientific Foundation For Restoration Program

USGS Modeling and Aquatic Habitat Study, as well as watershed action plan have been completed

Causes, environmental impacts and potential solutions are identified







Challenge: Balancing Competing Uses of the River

- Drinking water
- Household use
- Public health & safety
- Businesses and sustainable growth
- Agriculture
- Golf courses
- Lawns
- Pools
- Fish and shellfish
- Wildlife
- Water quality
- Ecosystem values
- Recreation
- Aesthetics
- Navigation
- Wastewater assimilation

Ipswich River Watershed Community Water Supplies:

~34 million gallons a day*

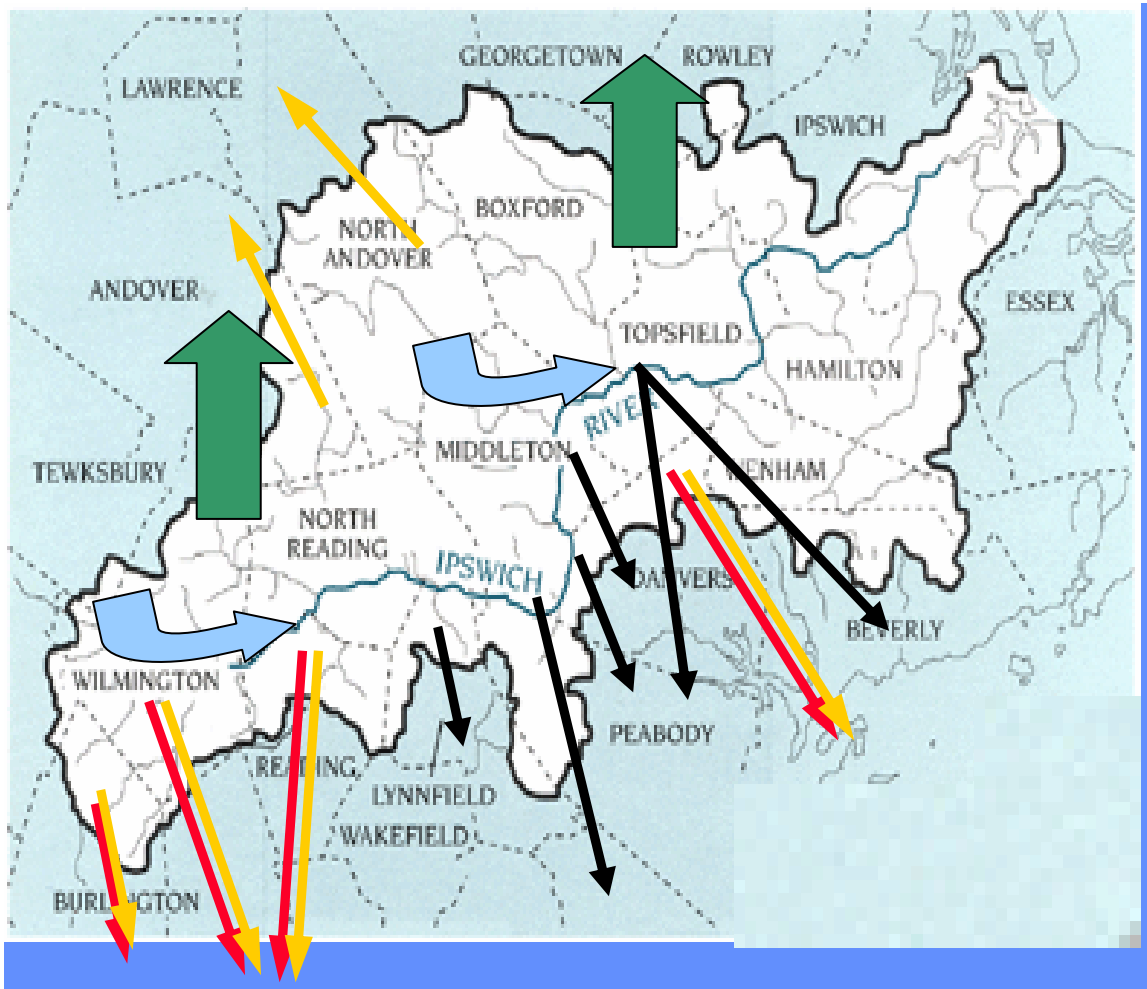
Surface Water (reservoirs)

- **Beverly/Salem**
- **Danvers/Middleton**
- **Lynn**
- **Peabody**

***Current authorization for public & private supplies**

Groundwater (wells)

- **Danvers/Middleton, Hamilton,Ipswich, Lynnfield, North Reading, Reading, Topsfield, Wenham, Wilmington**
- **Boxford (no public)**



- **Export of water for water supply**

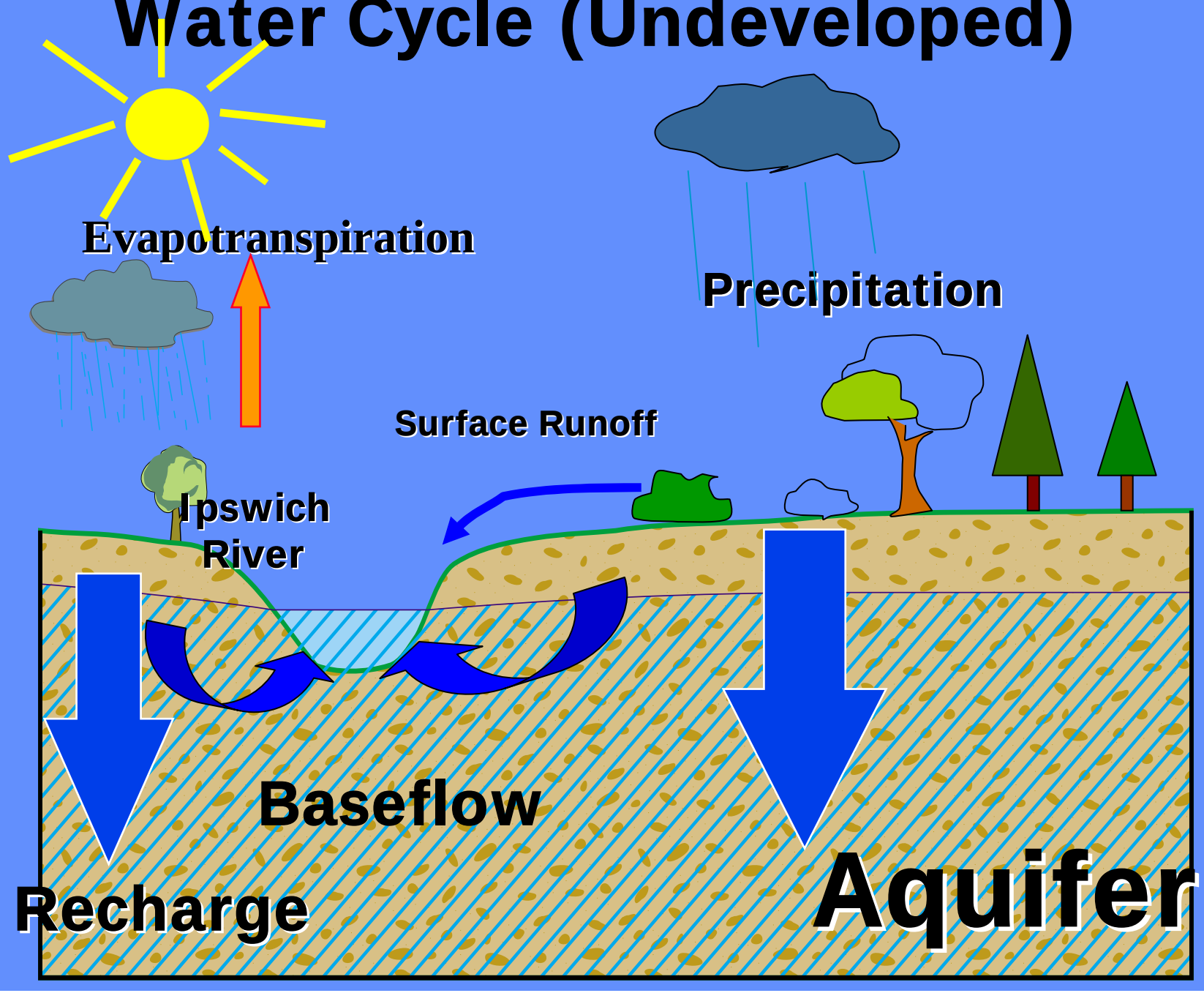
80% of all withdrawals (24 MGD)

- **Export of wastewater**
- **Inflow and Infiltration (55-65% of pipe flow)**
- **Increased Loss to Runoff**
- **Loss to Lawn Irrigation**

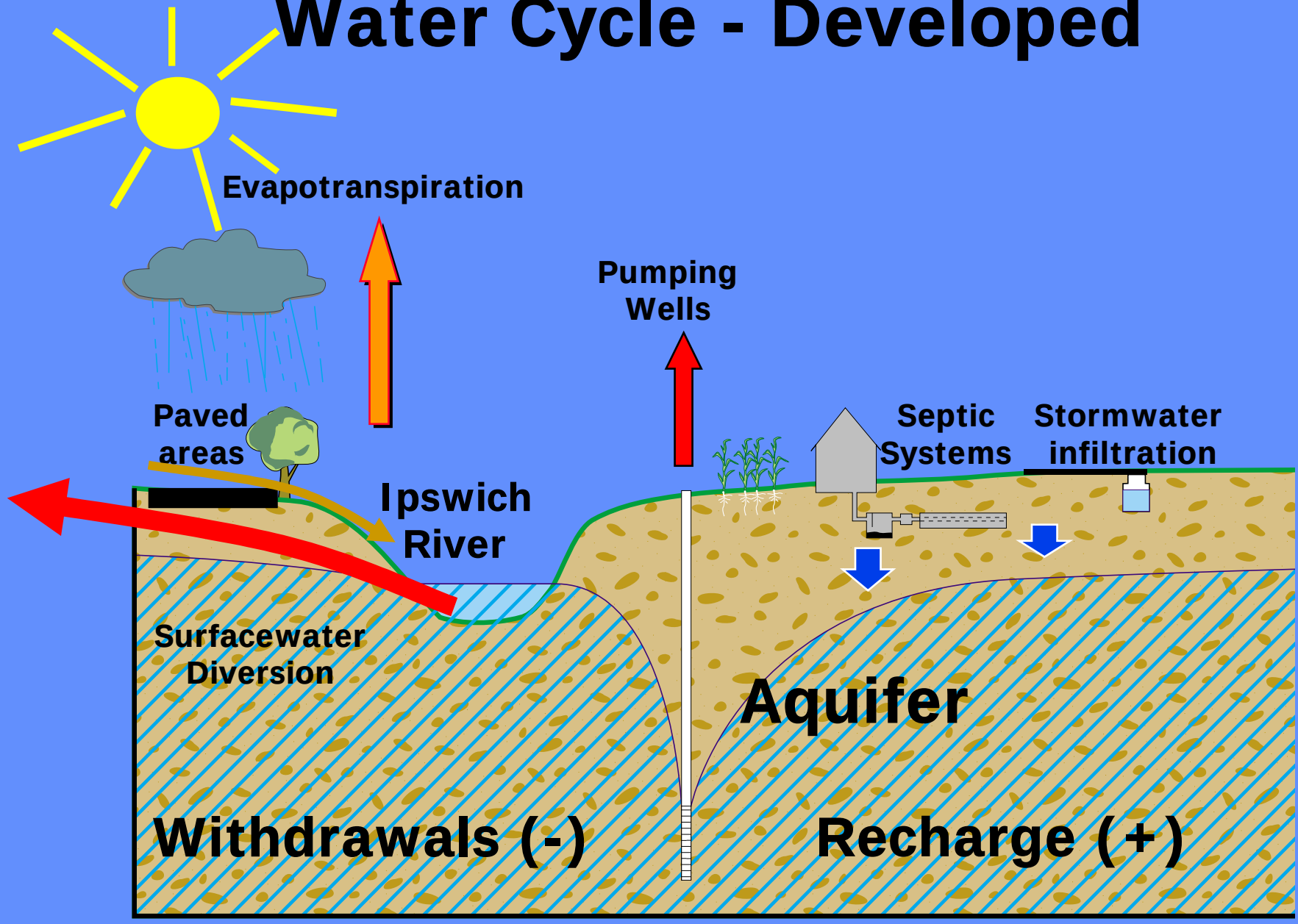
14.4 MGD Deficit

(5 MGD Upper Basin)

Water Cycle (Undeveloped)



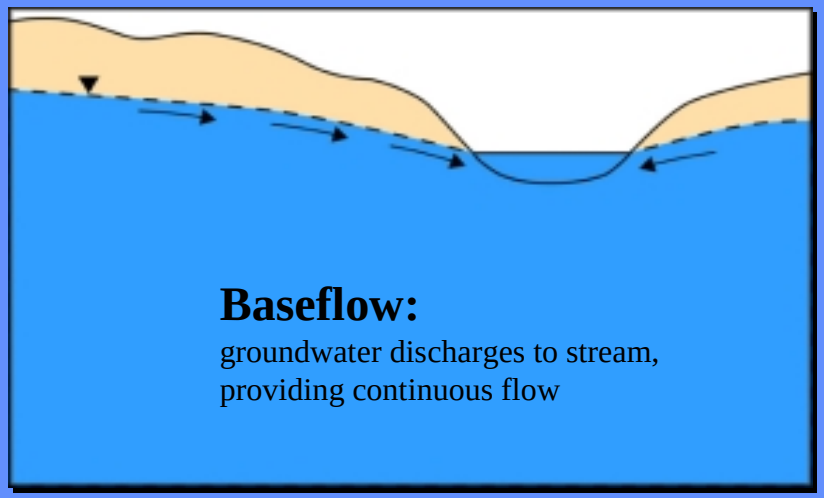
Water Cycle - Developed



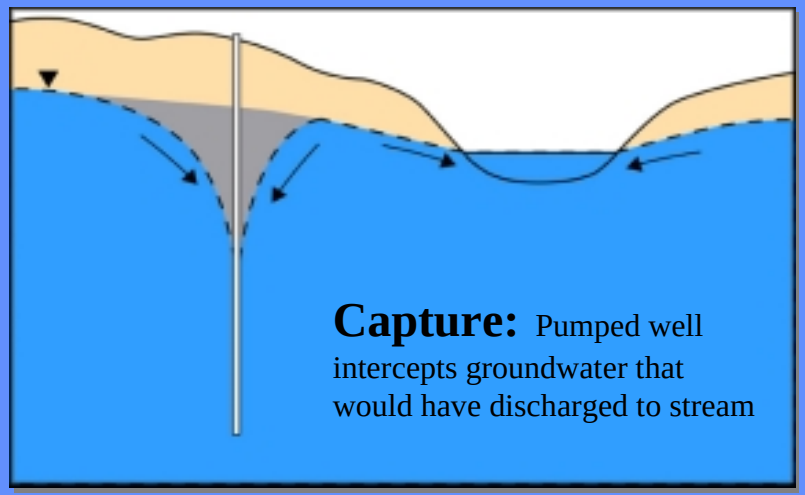
Groundwater: River's Elixir of Life

- Restore Groundwater = Restore the River
- Keeps river flowing perennially (baseflow)
- Travel through soils helps purify water
- ~50-55ºF year-round
  - Cooling influence in summer
  - Warming influence in winter
  - Temperature moderation is key factor in dissolved oxygen concentrations

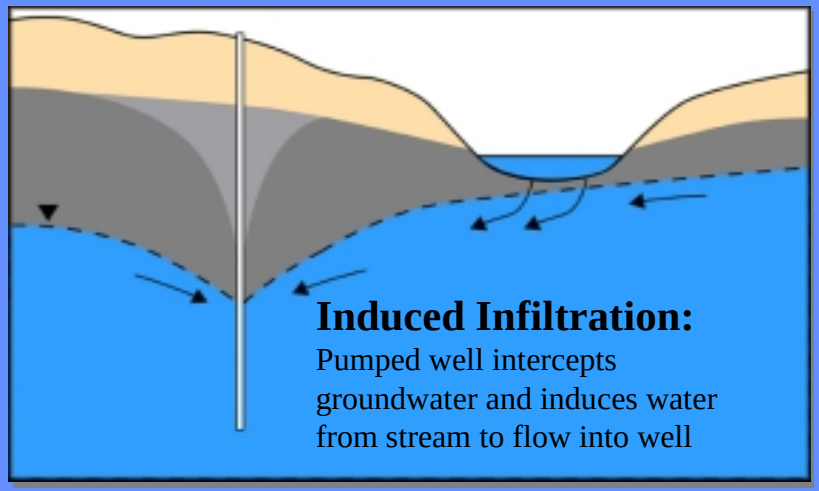
Effects of pumping wells



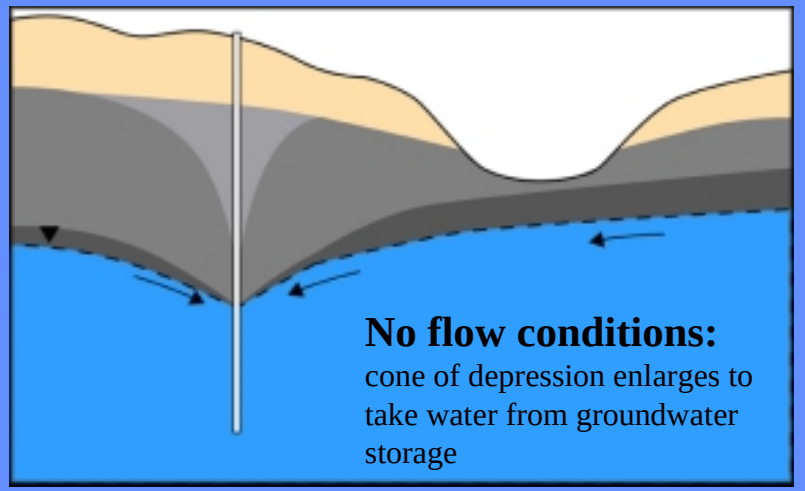
Baseflow:
groundwater discharges to stream, providing continuous flow



Capture: Pumped well intercepts groundwater that would have discharged to stream



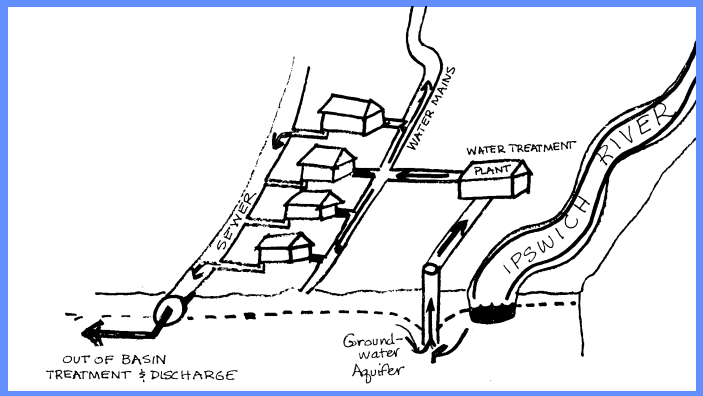
Induced Infiltration:
Pumped well intercepts groundwater and induces water from stream to flow into well



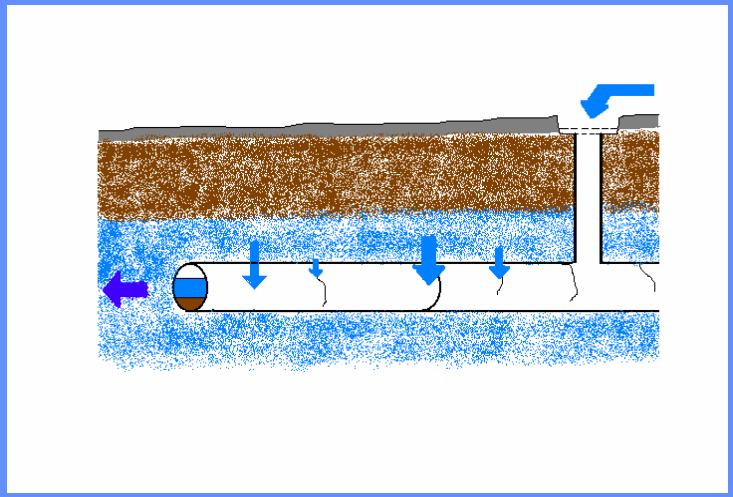
No flow conditions:
cone of depression enlarges to take water from groundwater storage

More Changes to the Water Budget

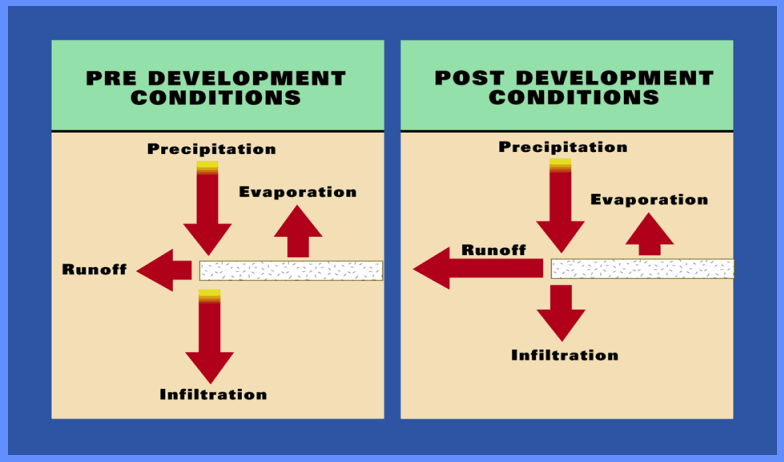
Sewers convey clean & dirty water

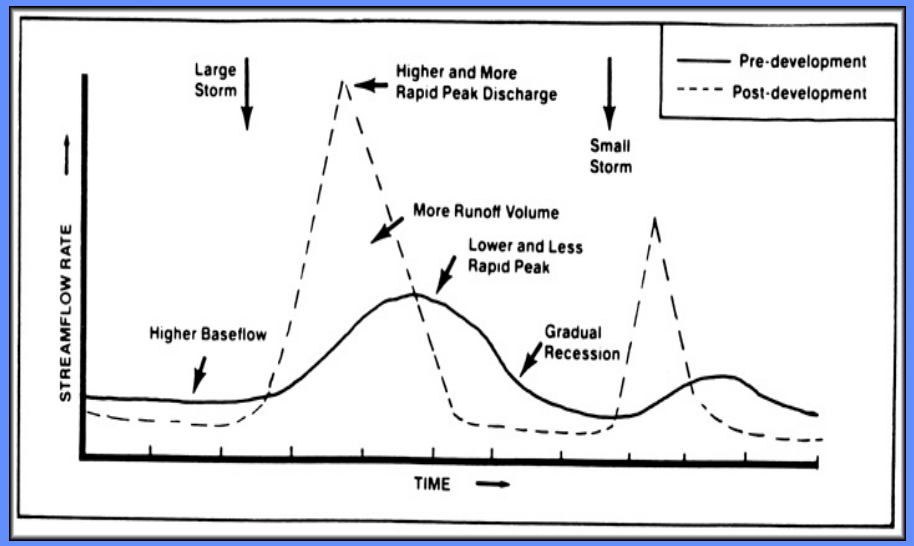


Infiltration/Inflow

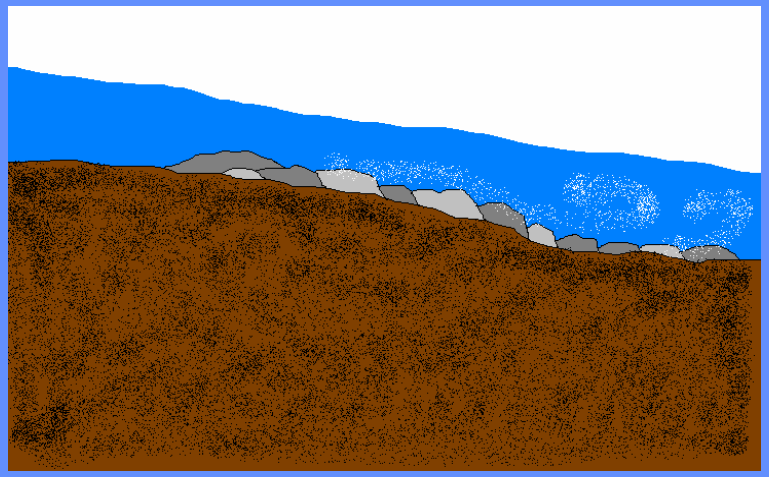


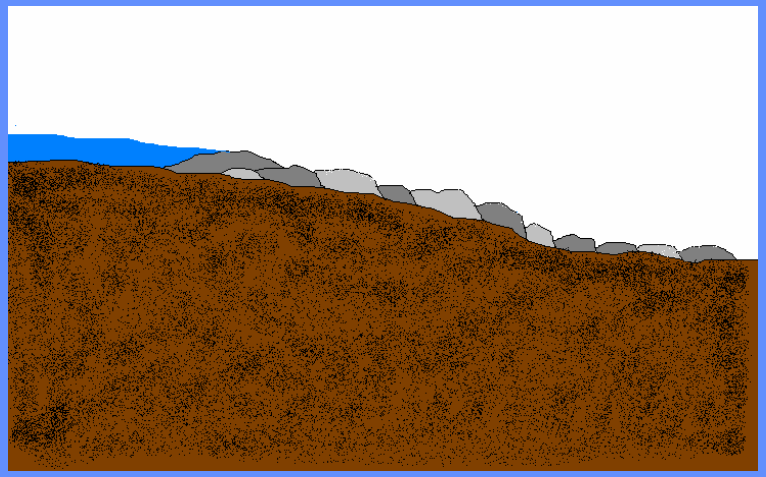
Higher peak flows and lower low flows





Critical Habitats: ***Riffles***



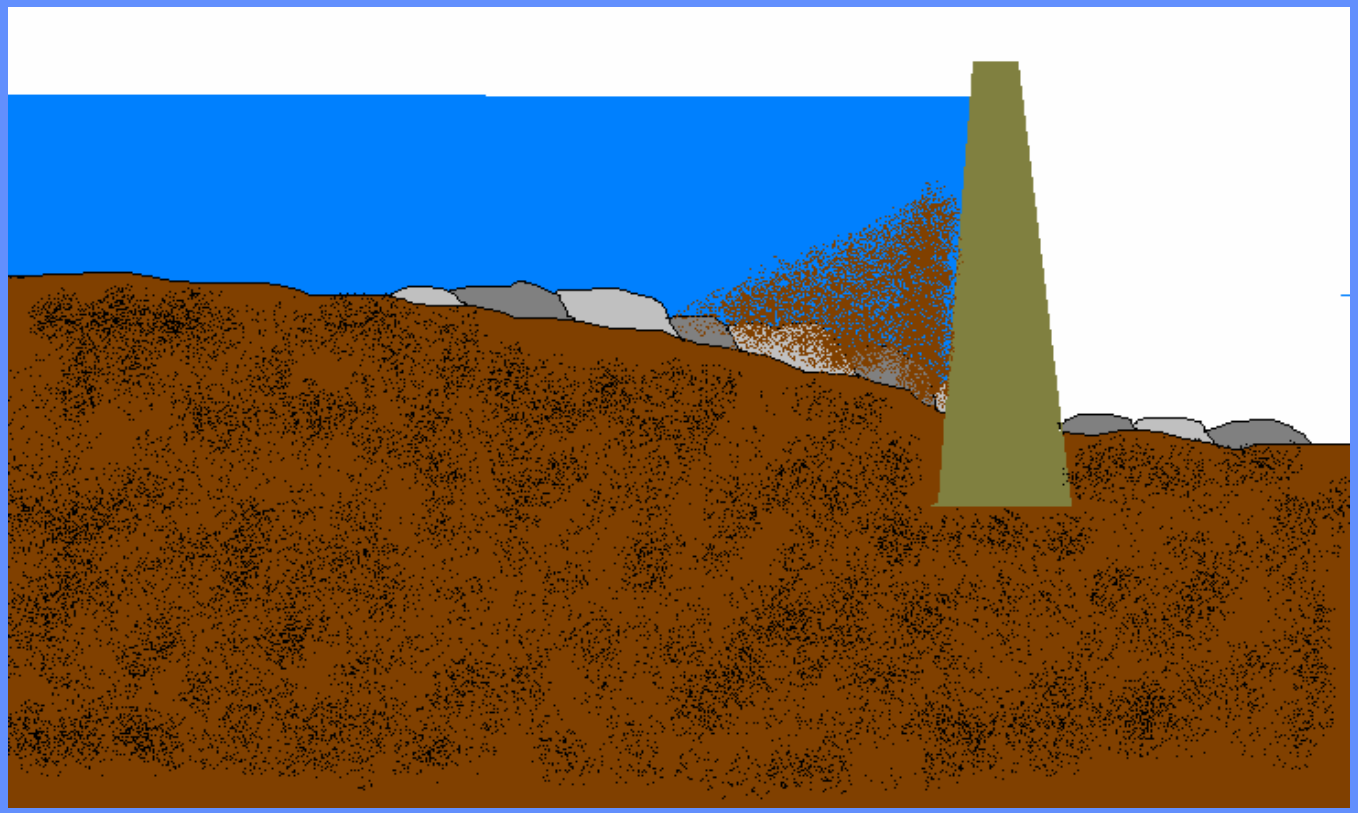


When riffles dry up, key habitat and oxygenation zones are lost, and river breaks apart into stagnant ponded areas –
River is **no longer flowing water**

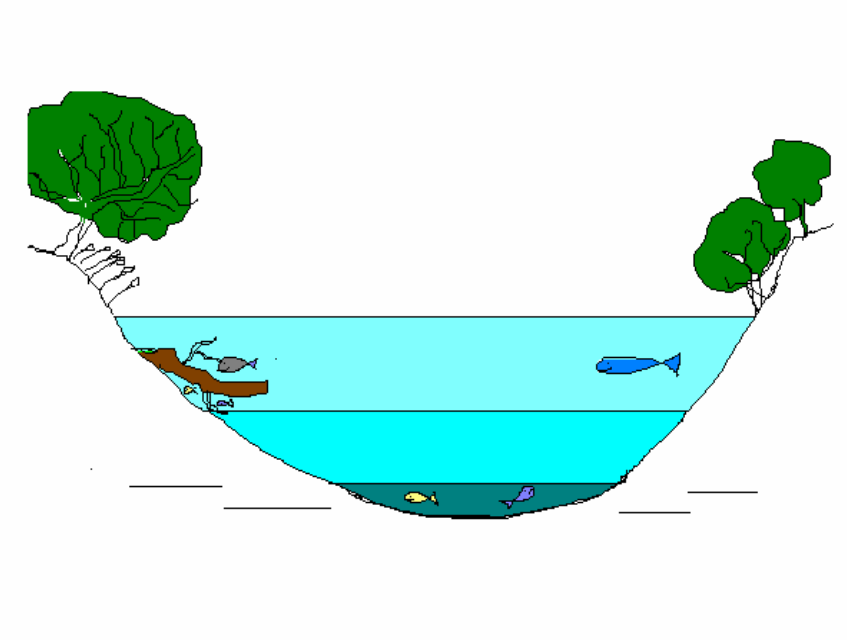
Effects of Dams:

drown riffles,“starve” downstream reaches, change flowing to pond habitat, block fish

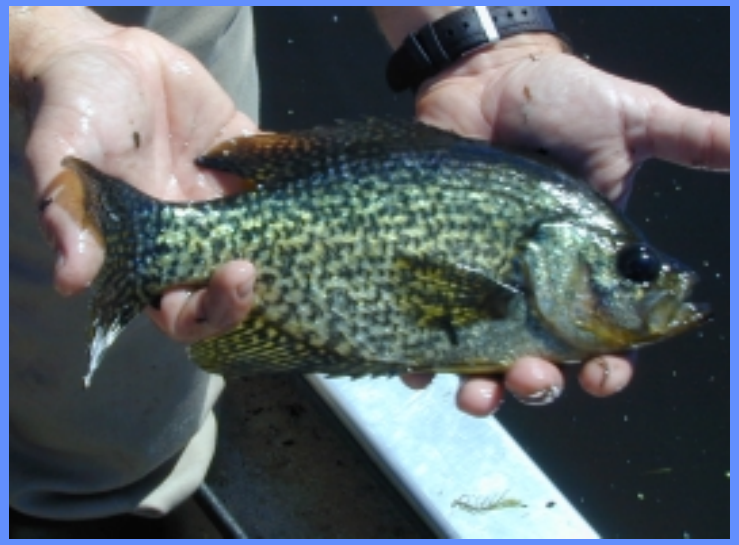
Myth: Water over dam is wasted



Critical Habitats:
Channel Margins



Generalist or “Pond” Fish



Black Crappie

Largemouth Bass

Pumpkinseed

Bluegill

Yellow Perch

Fluvial or “River” Fish

Brook Trout

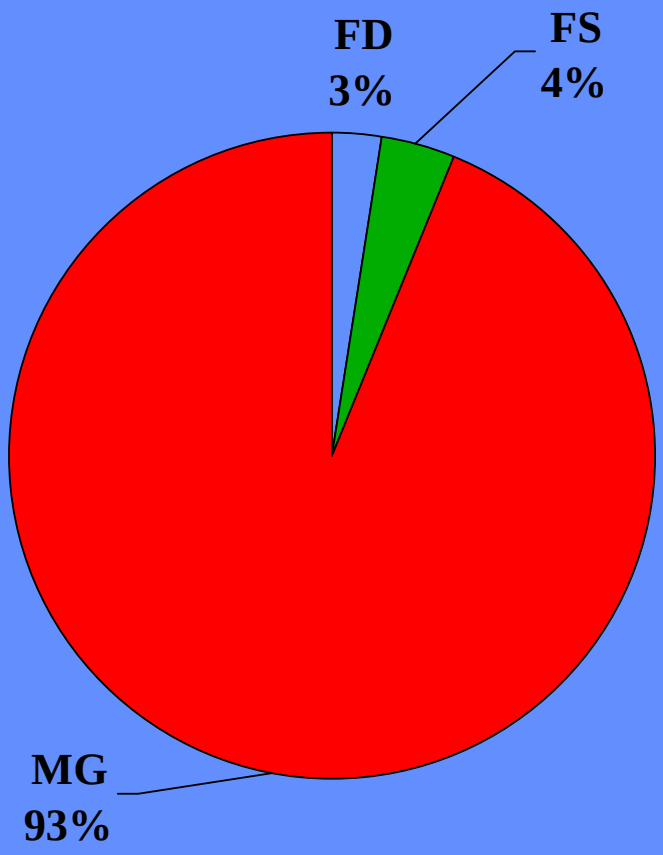
Fallfish

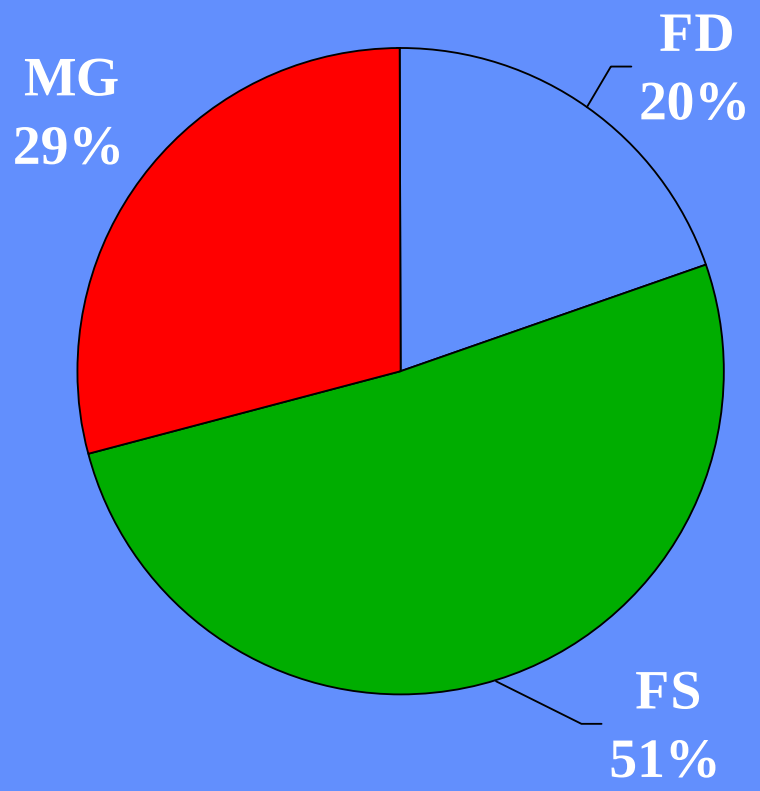
Creek Chubsucker

Tesselated Darter

Common Shiner

Existing and Target Fish Communities





Can these problems be solved?

YES!

Multi-pronged, integrated approach

- Save water, especially in summer
- Reduce use of “streamside” wells – import water
- Reduce export of water via sewers
- Get more water into groundwater aquifers
- Protect key land and repair damaged streambed
- Store water (especially small scale storage)
- Treat and reuse water; consider desalination

A Balanced Budget with room to grow

Benefits of Proposed Action Strategies

	Headwaters (Mgd)	Upper Watershed (Mgd)	Entire Watershed (Mgd)
OVERALL WATER USE REDUCTION GOALS:	5	9	14.4
Water Conservation Objectives	0.75	0.99	5.4
Stormwater Management	0.32	0.81	2.15
Alternative Water Sources	6.4	6.4	6.4
Wastewater Management	2.0	2.0	4.7
TOTAL ESTIMATED BENEFITS	9.5	10.2	18.7

Community Solutions:

Tools to Protect Water and Grow Smart

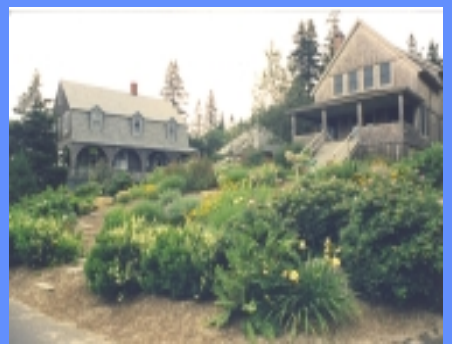
- **Water Conservation and Efficiency:**
  - **cost-effective; avoid infrastructure expansions**
- **Water Demand Offset Programs**
- **Alternative supplies, limited summer use**
- **Treat and Reuse Water/Reduce sewer loss**
  - **WASTEWATER – WASTE = WATER**
  - **Currently export ~24 mgd out-of-basin**
- **Low-Impact Development (LID)**
- **Protect and manage land to protect water**

Reservoirs: Pros and Cons

- Store high flows for use during low-flow periods
  - could be used to reduce groundwater pumping in summer (does not happen currently)
  - could provide controlled releases to augment flow (does not happen currently)
- New reservoir? Ipswich River currently supports 9 reservoirs; USGS modeling found insufficient flows to fill existing reservoirs during droughts
- Reservoir construction/expansion results in loss of wetlands; increases evaporation losses
- Onstream reservoirs typically inundate key habitats – riffles – and reduce flows or dewater downstream areas
- Expensive and Uncertain

Community Solutions: Low-Impact Development (LID)

- WIN-WIN: Solve flooding and low-flows while improving water quality
- Developed areas that retain, restore and even improve natural drainage
- Promote groundwater recharge (rain gardens, reduced impervious areas, permeable paving, grassed swales, Smart Storm, etc)
- Small-scale water storage: cisterns, rain barrels

Barriers to Success

- Funding: many communities would take more effective action if funding were available
- Lack of economic incentives for ecological protection
- Water reuse is not fully accepted
- Water restrictions and water rate hikes are politically unpopular
- River is a shared resource but there is no effective regional management structure
- Management of community growth is not integrated with water resource protection
- Inconsistent legal protection

Advocacy

- Give voice and a face for the issues
- Always be there
- Can do
- Expert help needed!!
- Dig dig dig
- No is not the final answer
- RIVERS ALLIANCE OF MASSACHUSETTS?

The Choice:
Smart Growth or …??

- Land protection: key habitats, recharge areas, riparian (riverside) areas
- Protect water quality:
  - **Prevent pollution**
  - **Far more cost effective than cleanups**
- Balance the water budget:
  - **Restore/ approximate natural flow regime**
  - **Solve flooding and low flows**
  - **Water banking/ mitigation approach**
  - **Water conservation cheaper than alternatives**
- Restore damaged areas
- Remove dams or improve fish passage

Legislative Role

- Funding and economic incentives to help communities implement alternatives
- Establish a Regional Restoration Program
  - Special legislation re funding, assessment
- Ensure that state law does not act to facilitate or perpetuate environmental damage
- Require that environmental damage be avoided, minimized and mitigated
- Address impacts of grandfathered withdrawals and transfers

Ipswich River Restoration Partnership

- Goal: Restore river and sustain economy
- Restored, healthy river will benefit region
- Public-Private Partnership
  - Political, business and environmental leaders
- Businesses taking active role in shaping restoration priorities
- Seek win-win opportunities
- Public collaborations and successes

Restoring the Ipswich River

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